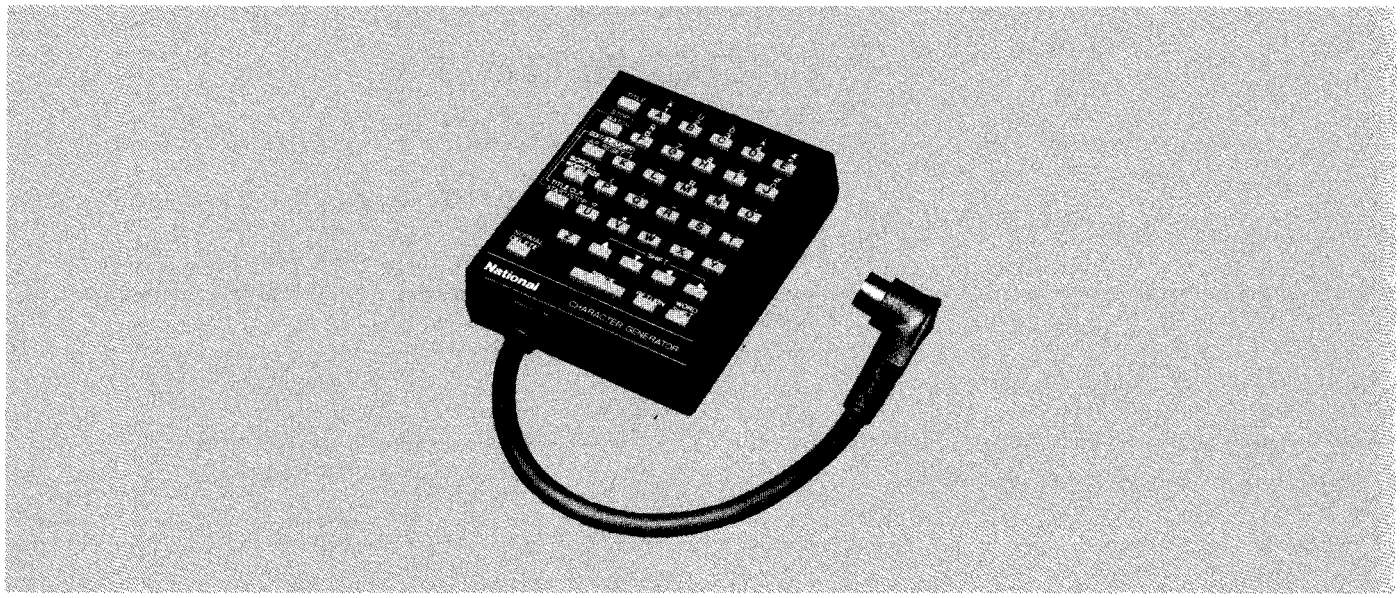
ORDER NO. VKD86010965C8

Service Manual

Character Generator

WV-KB12E/WV-KB12N



SPECIFICATIONS

- **WV-KB12**

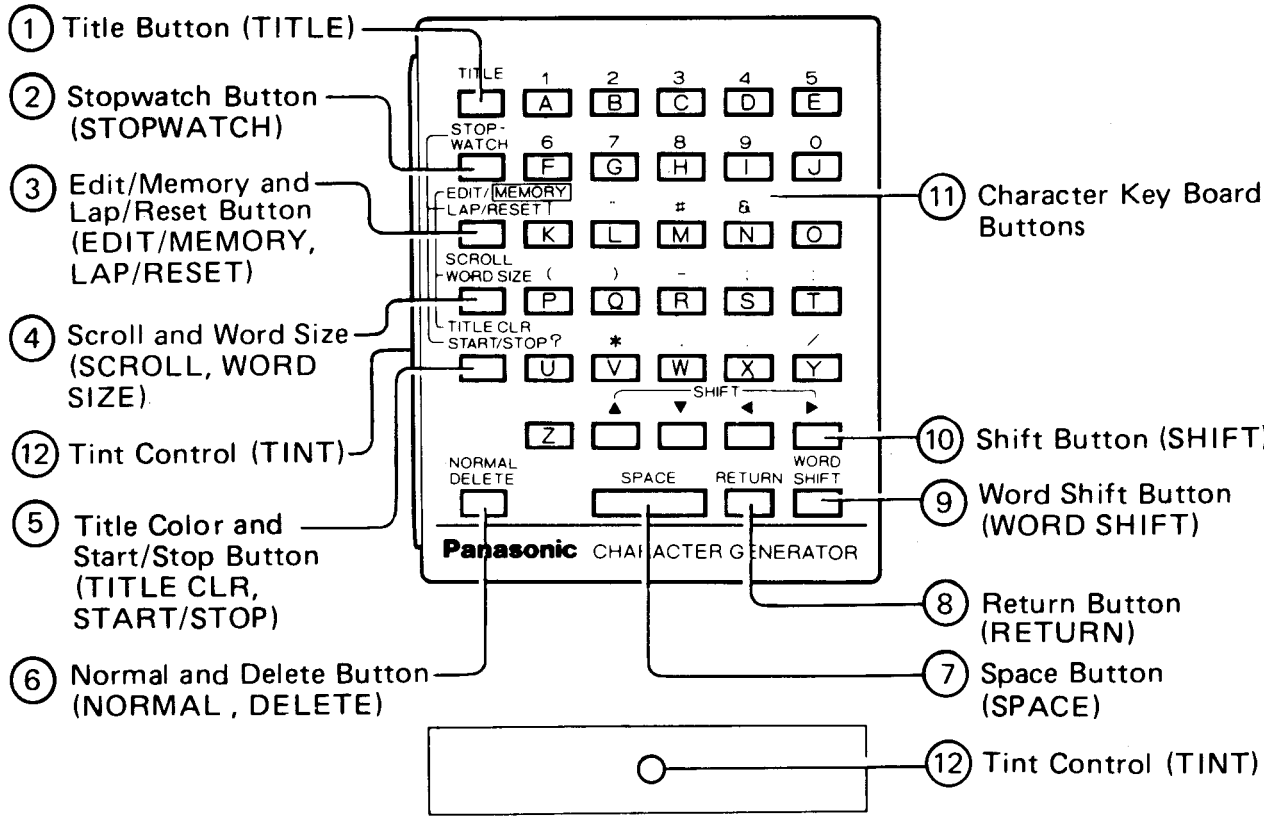
Power Source :	8.6V DC 0.05A
Backup Battery :	LR44 or SR44 1.5V x 3
Weight :	0.18 lbs (80g)
Dimensions :	2-9/16''(W) x 1-1/16''(H) x 3-9/16''(D) 65 (W) x 26.7 (H) x 90.5 (D) mm

Weight and dimensions shown are approximate.
Specifications are subject to change without notice.

National/Panasonic

Matsushita Electric Trading Co., Ltd.

OPERATING CONTROLS AND THEIR FUNCTIONS



1. **Title Button (TITLE)**
The 8 pages and scroll is sequentially changed by pressing this TITLE button as;

(1) In Edit Mode
The titles in 8 pages and scroll are edited/produced in edit mode by pressing the character key board buttons and when the editing page would completed and wants to shift for next page, press the TITLE button. The pages and scroll are sequentially shifted by TITLE button as;

1st page → 2nd page - - - → 8th page → scroll

(2) In Normal and/or Recording Mode
The edited titles are read out and sequentially shifted the pages by pressing the TITLE button as;

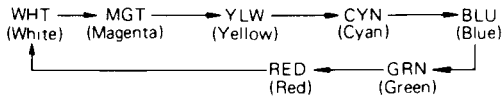
1st page → 2nd page - - - → 8th page

2. **Stopwatch Button (STOPWATCH)**
The stopwatch can be recorded with the camera picture.
The stopwatch is displayed in the Normal and/or Recording mode, but is not displayed in the scroll mode.

3. **Edit/Memory and Lap/Reset Button (EDIT/ MEMORY , LAP/RESET)**
This button has the dual functions : one for editing or memory of the titles and scroll, and another for stopwatch lap or stopwatch reset.

4. **Scroll and Word Size (SCROLL, WORD SIZE)**
This button has the dual functions : one for reading out scroll and starting or stopping of scroll in the Normal or Recording Mode and another for selecting three word sizes - small, middle, large in Edit Mode.
The display of the scroll always starts from first row.

5. **Title Color Start/Stop Button (TITLE CLR, START/STOP)**
This button has the dual functions : one for changing color of the character by pressing this button sequentially as;



and another for starting or stopping the stopwatch.

6. **Normal and Delete Button (NORMAL, DELETE)**
This button has dual functions :

(1) Picture with displayed characters
To be normal picture, press this button and delete all displayed characters from the picture.

(2) In Edit Mode
- o To delete the whole displayed characters in that page of 8 pages, press this button.
- o To delete the characters in line with the blinking character in scroll, press this button.

7. **Space Button (SPACE)**
While the titles or scroll are editing, the space among words is set by pressing this button just like typewriter's space button.

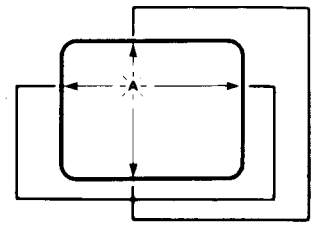
8. **Return Button (RETURN)**
(1) Titles in 8 pages
- o The blinking position is shifted to first position of next line while the titles are editing.

(2) Titles in Scroll
The blinking position is shifted to the first position of next line and whole previous line is also shifted to one step up.

9. **Word Shift Button (WORD SHIFT)**
By pressing this button, the alphabetic words and numerical numbers/symbol marks can be selected.

10. **Shift Button (SHIFT)**

(1) Titles in 8 pages
The blinking positions are shifted as circle on the same row or column as shown below ;



(2) Titles in Scroll
The blinking position are shifted as circle on the same row, but for column, ' the blinking position are shifted up to the first row and stopped, or are shifted down to the 40th row and stopped.
When the shift button is pushed once, then one space can be shifted on the same row or column. While the shift button is kept pushing, Auto-repeat function (shift sequentially) can be obtained on the same row or column.

11. **Character Key Board Buttons**
The alphabetic words and numerical numbers/symbol marks can be selected random accessly as shown on the key board button when the titles on 8 pages and scroll.

12. **Tint Control (TINT)**
This control can adjust the tint of color.
This control should be made by qualified service personnel.

CIRCUIT DESCRIPTIONS

This full keyboard character generator WV-KB12 contains following circuits.

1. Power Regulator Circuit
2. Sync Separation Circuit
3. External Chroma Generator Circuit
4. REC & Display Control Circuit
5. Microprocessor Circuit
6. Character Generator Circuit

1. Power Regulator Circuit

+5.6V regulator circuit consisting of IC2(a) and 5.6V zener diode D1 receives +8.6V DC and generates +5.6V DC power. .

This regulated +5.6V DC is then supplied to other circuits as +5.0V power through D4 or D3.

+5.0V regulator circuit consisting of IC2(b) generates +5.0V DC and +5V DC power is then supplied to pins 17 and 38 of IC4.

When the character generator is disconnected from the camera and +8.6V DC power is not supplied, the back-up batteries BATT-1 supplies 4.5V (1.5V x 3) DC power to pin 25 of microprocessor IC5 through D3 and L6. Transistor Q11 and R45, R46, R93 and C42 generate power ON/OFF signal which is obtained at the collector of Q11. It is then supplied to pins 4 and 59 of IC5.

2. Sync Separation Circuit

The composite sync signal generated in the camera is supplied to pin 5 of IC3 through pin 6 of CN2 and buffer Q27 and the detected horizontal sync signal obtained at pin 7 of IC3 is fed to pin 3 of IC4 and pin 55 of IC5.

The detected composite sync signal obtained at pin 7 of IC3 is forwarded to an integrator circuit consisting of R33, R34, C19 and C20 through buffer Q15 in order to generate a vertical sync signal and it is then fed to pin 3 of IC3.

The vertical sync signal obtained at pin 1 of IC3 is then supplied to pin 5 of IC5.

3. External Chroma Generator Circuit

The subcarrier-1 (SC1) and subcarrier-2 (SC2) signals generated in the camera are supplied to pins 6 and 7 of IC1 through pins 3 and 4 of CN2, buffers Q1 and Q2 and band pass amplifiers Q4 and Q5 respectively.

On the other hand, the title color selection signal generated by the output signals from pins 22, 23, 24 of IC5 through a data latch IC7 and a digital-analog (D/A) converter consisting of R53, R54, R56, R57, R58 and R59 is fed to pin 8 of IC1.

The generated subcarrier signal whose phase is corresponding to the title color obtained at pin 9 of IC1 is forwarded to the phase shifter consisting of Q6, Q7 and Q25 and its phase is matched to that of burst signal of the camera by adjusting CT1 (TINT).

The subcarrier signal obtained at the emitter of Q7 is fed to the camera through pin 7 of CN2.

When the white color is selected, a DC signal is obtained at pin 9 of IC1 and fed to the camera through the emitter and collector of Q8.

The H level obtained at pin 28 of IC5 is fed to the camera through Q13 and pin 2 of CN2 when the red or blue color is selected.

4. REC & Display Control Circuit

When the VTR is REC/PLAY mode, the high (H) level signal (DC signal) is supplied together with SC1 signal from the camera.

This H level signal is detected by Q9 and Q22 and supplied to pin 60 of IC5.

When the VTR is excepted REC/PLAY mode, the low (L) level signal is supplied to pin 60 of IC5.

The character display ON/OFF signal (H : Not display, L : Display) is also supplied together with SC2 signal from the camera. This H level signal is detected by Q10 and Q23 and then supplied to pin 61 of IC5.

5. Microprocessor Circuit

The microprocessor circuit is consisting of main microprocessor IC5 and a RAM (random access memory) IC6 for storing the titles.

Pin identification of IC5 is as follows.

Pin identification of IC5

Pin No.	Name	Descriptions	
1	P12	Not used	
2	P13	"	
3	$\overline{\text{SYNC}}$	"	
4	$\overline{\text{SIRQ}}$	Power ON/OFF IN (ON : H)	
5	$\overline{\text{IRQ}}$	V. sync IN	
6		Not used	
7		"	
8		"	
9	$\overline{\text{RST}}$	Reset IN (Reset : L)	
10	P20	Data output bus	0
11	P21	"	1
12	P22	"	2
13	P23	"	3

14	P30	"	4
15	P31	"	5
16	P32	"	6
17	P33	"	7
18	P40	Not used	
19	P41	"	
20	P42	"	
21	P43	"	
22	P50	Color select out	0
23	P51	"	1
24	P52	"	2
25	Vcc	+B Power IN	
26	PC0	Address output bus	8
27	PC1	"	9
28	P53	Luminance Correction (H : Blue, Red)	
29	P60	Key scan IN	0
30	P61	"	1
31	P62	"	2
32	P63	"	3
33	P70	"	4
34	P71	"	5
35	P72	"	6
36	P73	"	7
37	P80	V. sync OUT	
38	P81	Not used	
39	P82	ADM OUT	
40	P83	LDI OUT	
41	P90	CE OUT	
42	P91	OE OUT	
43	P92	R/W OUT	
44	P93	Not used	
45	PA0	Address output bus	0
46	PA1	"	1
47	PA2	"	2
48	PA3	"	3
49	PB0	"	4
50	PB1	"	5
51	PB2	"	6
52	PB3	"	7
53	OSC2	Clock Pulse Generator	
54	OSC1	"	
55	X1	H. sync IN	
56	X0	Not used	
57	Vss	Ground	
58	P00	$\overline{\text{WRQ}}$ IN	
59	P01	Power ON/OFF (ON : H)	
60	P02	REC IN (REC : H)	
61	P03	Display ON/OFF IN (ON : L)	
62	PC2	Address output bus A	
63	P10	Key scan IN	8
64	P11	Not used	

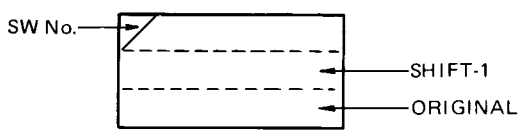
Pin identification of IC4

Pin No.	Name	Descriptions	
1	V. SYNC	V. SYNC IN	
2		Not used	
3	H. SYNC	H. SYNC IN	
4		Not used	
5	DO0	"	
6	DO1	"	
7		"	
8	DO2	"	
9		"	
10	DO3	"	
11		"	
12	TST	Test IN	
13	Vss	Ground	
14	OSC1	Clock Pulse Generator	
15	OSC2	"	
16		Not used	
17	VDD	+B Power IN	
18	VOB	Not used	
19	VOW	Character OUT	
20	MSP0	Latch pulse OUT	
21		Not used	
22	MSP1	Title Mask Pulse 1 OUT	
23		Not used	
24	MSP2	"	
25			
26	MSP3	"	
27		"	
28	WRQ	WRQ OUT	
29		Not used	
30	LDI	LDI IN	
31	ADM	ADM IN	
32		Not used	
33	DA0	Data Address bus	0
34	DA1	"	1
35	DA2	"	2
36		Not used	
37	DA3	Data Address bus	3
38	VDD	+B Power IN	
39	DA4	Data Address bus	4
40	DA5	"	5
41	DA6	"	6
42	DA7	"	7

*ADM : Address mode select input
LDI : Data loading input
CE : Chip Enable input
OE : Output Enable input
R/W : Read or Write control input
WRQ : Write Request output
MSP : Masking Pulse output

Table of Key-Scan

IN \ OUT	PA0	PA1	PA2	PA3	PB0
P60	1 TITLE	2 STOP-WATCH ON/OFF	3 COLOR START/STOP	4 ↑	5 ↓
P61	6 DELETE	7 SCROLL WORD SIZE	8 EDIT/MEMORY LAP/RESET	9 ←	10 →
P62	11 1 A	12 2 B	13 3 C	14 4 D	15 5 E
P63	16 6 F	17 7 G	18 8 H	19 9 I	20 0 J
P70	21 ! K	22 " L	23 # M	24 & N	25 ' O
P71	26 (P	27) Q	28 – R	29 ; S	30 : T
P72	31 ? U	32 * V	33 , W	34 . X	35 / Y
P73	36 Z	37 SPACE	38 RETURN	39 SHIFT	



6. Character Generator Circuit

The character signal generated by IC4 is obtained at pin 19 of IC4 and fed to the camera through buffer Q26 and Q18 and pin 5 of CN2.

ADJUSTMENT PROCEDURE

Test Equipment Required

- o WV-V3 camera
- o Color video monitor
- o Vectorscope

Disassembling for Adjustment

- o Remove three screws holding the bottom cover and remove the bottom cover.

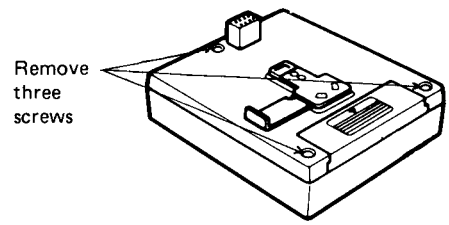


Fig. 1

Connection and Setting Up for Adjustment

- o Connect the camera cable from the camera to the power supply.
- o Connect the video cable from the power supply to the color video monitor.
- o Terminate the color video monitor by 75 ohms.
- o Connect the Full-Keyboard Titler WV-KB12 to the camera.

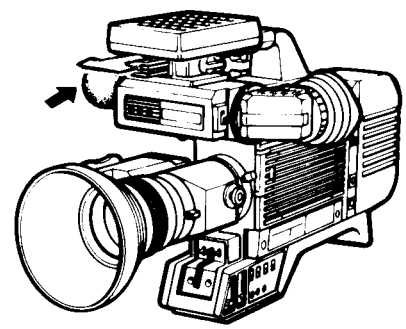


Fig. 2

Adjustment

o Refer to Fig. 1-3 for the location of adjusting controls.

(1) Character width adjustment

Adjust :	VR1 (CHARACTER WIDTH)
Observe :	Color video monitor

o Press the EDIT button.
o Press the WORD SIZE button so that the large size (7 words x 2 rows) is observed on the monitor.
o Adjust CHARACTER WIDTH VR1 so that the dots or characters on the monitor become as follows.

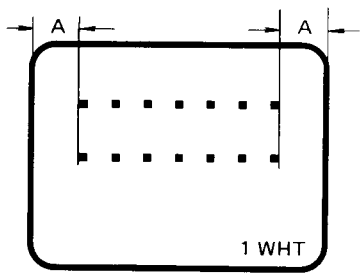


Fig. 1-1

(2) Tint adjustment

Adjust :	CT1 (TINT)
Observe :	Vectorscope

o Press the EDIT button.
o Press the WORD SIZE button so that the large size (7 words x 2 rows) is observed on the monitor.
o Write/edit 3 or 4 any word on the page.
o Press the TITLE CLR button so that the color indication on the right bottom position on the monitor becomes MGT.
o Set the display mode of the vectorscope to NTSC mode.
o Adjust TINT CT1 so that two vectors become one above another on the vectorscope.

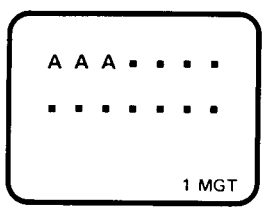


Fig. 1-2

Fig. 1-3

LOCATION OF CONTROLS

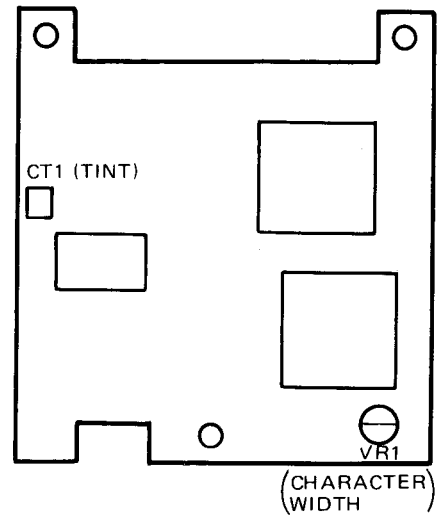
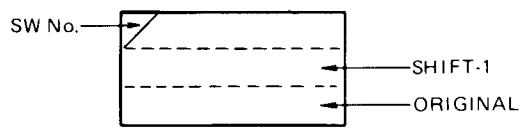


Fig. 1-3

Identification of SW1 ~ SW39

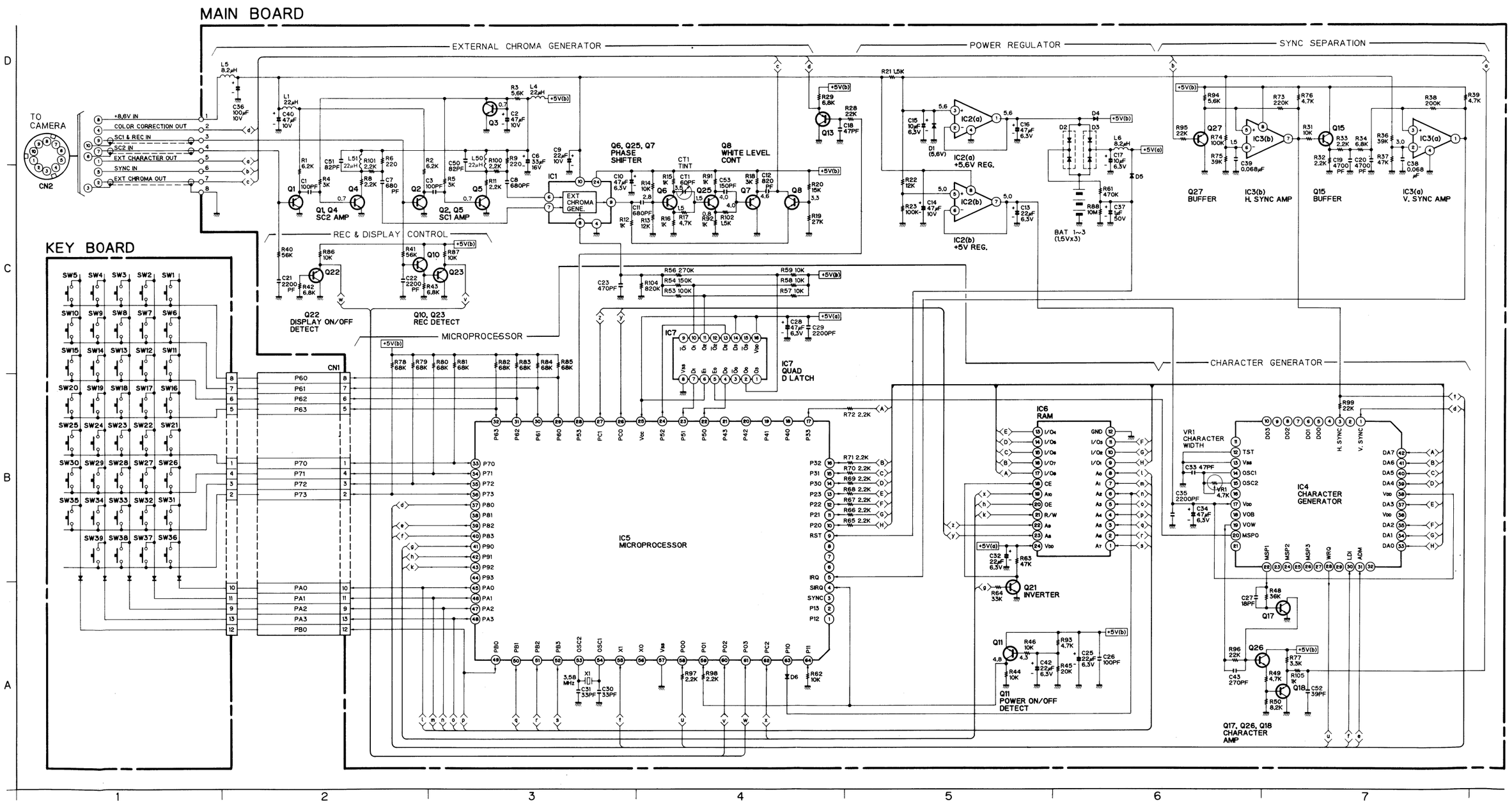
IN \ OUT	PA0	PA1	PA2	PA3	PB0
P60	1 TITLE	2 STOP-WATCH ON/OFF	3 COLOR START/STOP	4 ↑	5 ↓
P61	6 DELETE	7 SCROLL WORDSIZE	8 EDIT/MEMORY LAP/RESET	9 ←	10 →
P62	11 1 A	12 2 B	13 3 C	14 4 D	15 5 E
P63	16 6 F	17 7 G	18 8 H	19 9 I	20 0 J
P70	21 ! K	22 " L	23 # M	24 & N	25 ' O
P71	26 (P	27) Q	28 – R	29 ; S	30 : T
P72	31 ? U	32 * V	33 , W	34 . X	35 / Y
P73	36 Z	37 SPACE	38 RETURN	39 SHIFT	



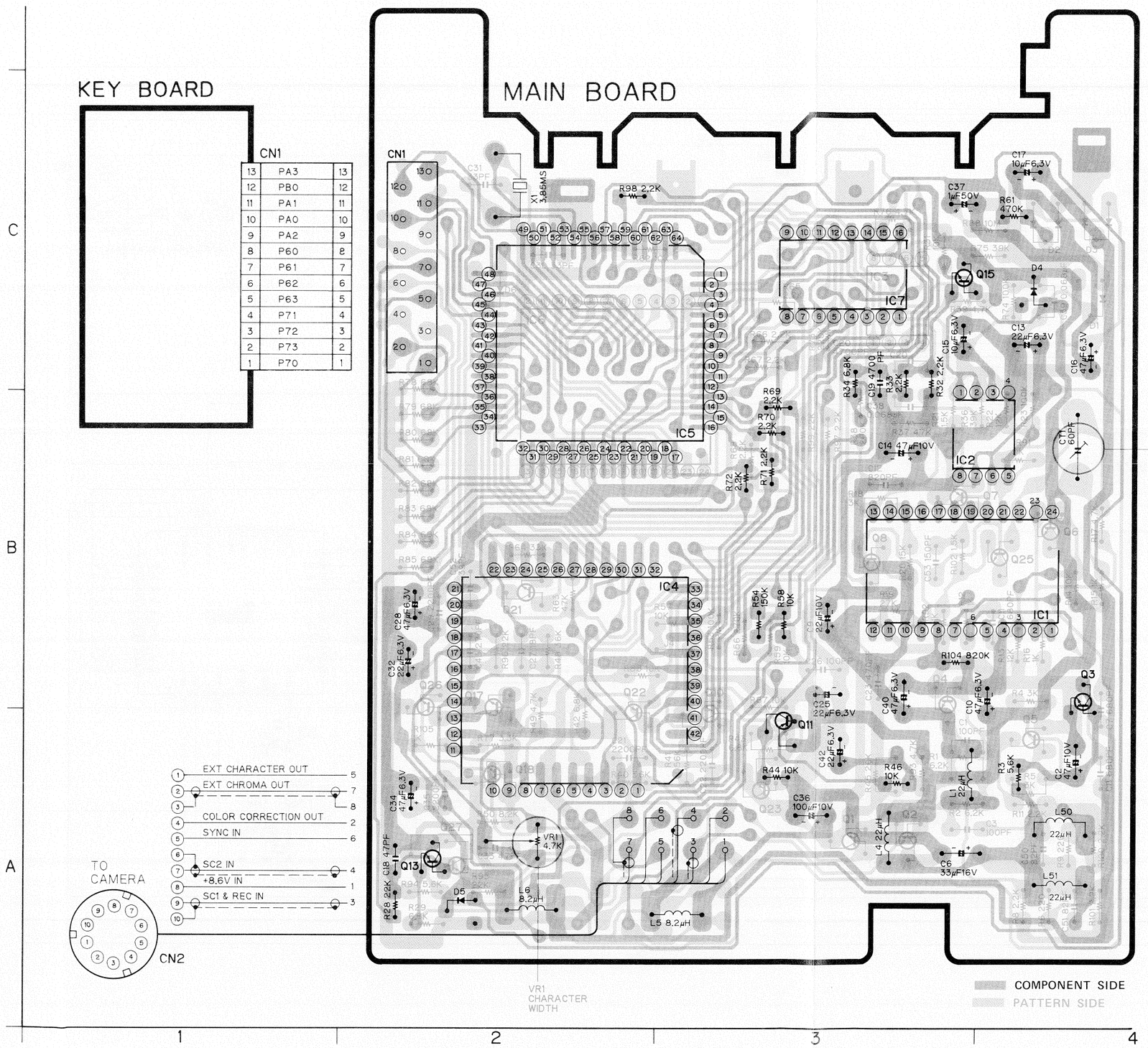
Location of WV-KB12

IC1	AN2560S		C3
IC2	NJM3414M		C5, D5
IC3	AN6914S		D6, D7
IC4	MN1287CVN		B7
IC5	MN1554CVQ		B3, B4
IC6	TC5517BFL-20		B6
IC7	MN4042BS		C4
Q1	2SB709-QRS	[A]	C2
Q2	2SB709-QRS	[A]	C2
Q3	2SC2404-CD	[U]	D3
Q4	2SC2404-CD	[U]	C2
Q5	2SC2404-CD	[U]	C3
Q6	2SC2404-CD	[U]	C4
Q7	2SB709-QRS	[A]	C4
Q8	2SB709-QRS	[A]	C4
Q10	2SD601-QRS	[Y]	C2
Q11	2SB709-QRS	[A]	A5
Q13	2SB709-QRS	[A]	D4
Q15	2SD601-QRS	[Y]	D7
Q17	2SD601-QRS	[Y]	A7
Q18	2SB709-QRS	[A]	A7
Q21	2SD601-QRS	[Y]	A5
Q22	2SB709-QRS	[A]	C2
Q23	2SB709-QRS	[Y]	C3
Q24	2SD601-QRS	[Y]	C4
Q25	2SC2404-CD	[U]	C4
Q26	2SC2404-CD	[U]	A7
Q27	2SB709-QRS	[A]	D6
D1	MA3056HTW	[5.6H]	D5
D2	MA151WK	[MT]	D6
D3	MA151WK	[MT]	D6
D4	MA151K	[MH]	D6
D5	MA151K	[MH]	C6
D6	MA151K	[MH]	A4

SCHEMATIC DIAGRAM OF WV-KB12



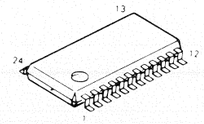
CONDUCTOR VIEW OF WV-KB12



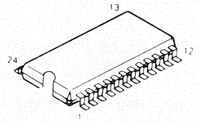
Location of WV-KB12

IC1	AN2560S		C4, C5
IC2	NJM3414M		C5, D5
IC3	AN6914S		D4, D5
IC4	MN1287CVN		B3
IC5	MN1554CVQ		C3, D3
IC6	TC5517BFL-20		C3, D3
IC7	MN4042BS		C3
Q1	2SB709-QRS	[A]	A4
Q2	2SB709-QRS	[A]	A5
Q3	2SC2404-CD	[U]	B5
Q4	2SC2404-CD	[U]	B5
Q5	2SC2404-CD	[U]	B5
Q6	2SC2404-CD	[U]	C5
Q7	2SB709-QRS	[A]	C5
Q8	2SB709-QRS	[A]	C4
Q10	2SD601-QRS	[Y]	B4
Q11	2SB709-QRS	[A]	B4
Q13	2SB709-QRS	[A]	A2
Q15	2SD601-QRS	[Y]	D5
Q17	2SD601-QRS	[Y]	B3
Q18	2SB709-QRS	[A]	B3
Q21	2SD601-QRS	[Y]	C3
Q22	2SB709-QRS	[A]	B3
Q23	2SB709-QRS	[Y]	B4
Q24	2SD601-QRS	[Y]	A3
Q25	2SC2404-CD	[U]	C5
Q26	2SC2404-CD	[U]	B2
Q27	2SB709-QRS	[A]	A2
D1	MA3056HTW	[5.6H]	D5
D2	MA151WK	[MT]	D5
D3	MA151WK	[MT]	D5
D4	MA151K	[MH]	D5
D5	MA151K	[MH]	A2
D6	MA151K	[MH]	D3

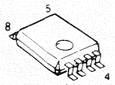
AN2560S



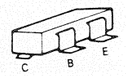
TC5517BFL-20



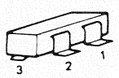
NJM3414M
AN6914S



2SD601-QRS
2SC2404-CD
2SB709-QRS

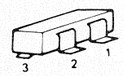


MA151K



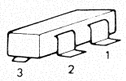
1 : NC
2 : Anode
3 : Cathode

MA151WK



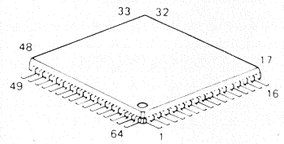
1 : Anode
2 : Anode
3 : Cathode

MA3056HTW

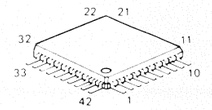


1 : NC
2 : Cathode
3 : Anode

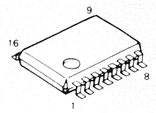
MN1554CVQ



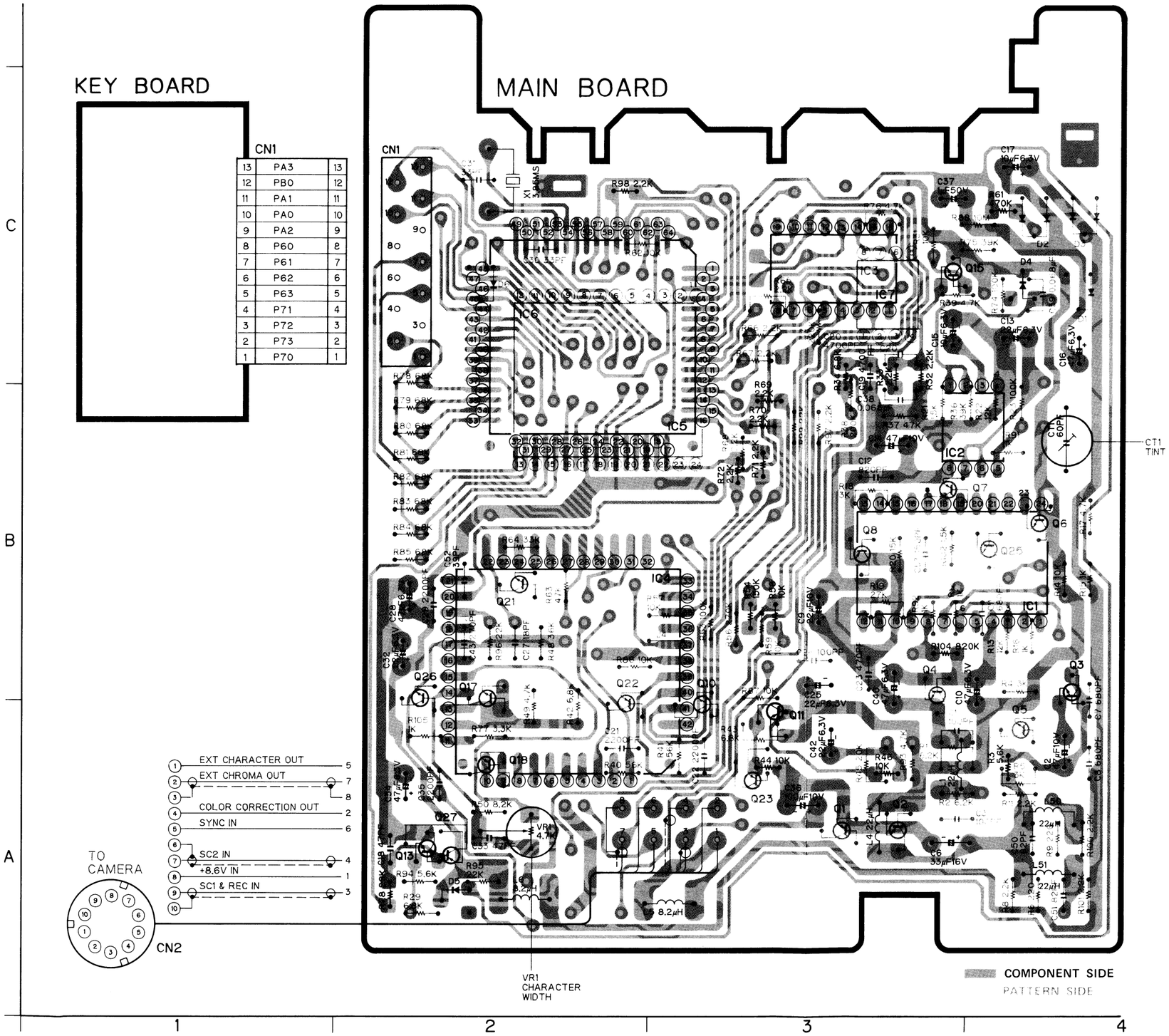
MN1287CVN



MN4042BS



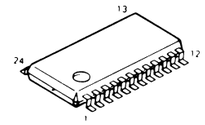
CONDUCTOR VIEW OF WV-KB12



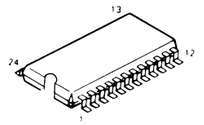
Location of WV-KB12

IC1	AN2560S		C4, C5
IC2	NJM3414M		C5, D5
IC3	AN6914S		D4, D5
IC4	MN1287CVN		B3
IC5	MN1554CVQ		C3, D3
IC6	TC5517BFL-20		C3, D3
IC7	MN4042BS		C3
Q1	2SB709-QRS	[A]	A4
Q2	2SB709-QRS	[A]	A5
Q3	2SC2404-CD	[U]	B5
Q4	2SC2404-CD	[U]	B5
Q5	2SC2404-CD	[U]	B5
Q6	2SC2404-CD	[U]	C5
Q7	2SB709-QRS	[A]	C5
Q8	2SB709-QRS	[A]	C4
Q10	2SD601-QRS	[Y]	B4
Q11	2SB709-QRS	[A]	B4
Q13	2SB709-QRS	[A]	A2
Q15	2SD601-QRS	[Y]	D5
Q17	2SD601-QRS	[Y]	B3
Q18	2SB709-QRS	[A]	B3
Q21	2SD601-QRS	[Y]	C3
Q22	2SB709-QRS	[A]	B3
Q23	2SB709-QRS	[Y]	B4
Q24	2SD601-QRS	[Y]	A3
Q25	2SC2404-CD	[U]	C5
Q26	2SC2404-CD	[U]	B2
Q27	2SB709-QRS	[A]	A2
D1	MA3056HTW	[5.6H]	D5
D2	MA151WK	[MT]	D5
D3	MA151WK	[MT]	D5
D4	MA151K	[MH]	D5
D5	MA151K	[MH]	A2
D6	MA151K	[MH]	D3

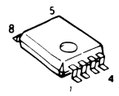
AN2560S



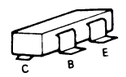
TC5517BFL-20



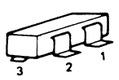
NJM3414M
AN6914S



2SD601-QRS
2SC2404-CD
2SB709-QRS

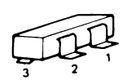


MA151K



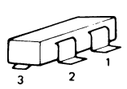
1 : NC
2 : Anode
3 : Cathode

MA151WK



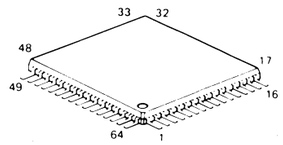
1 : Anode
2 : Anode
3 : Cathode

MA3056HTW

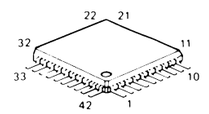


1 : NC
2 : Cathode
3 : Anode

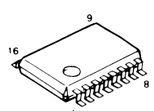
MN1554CVQ



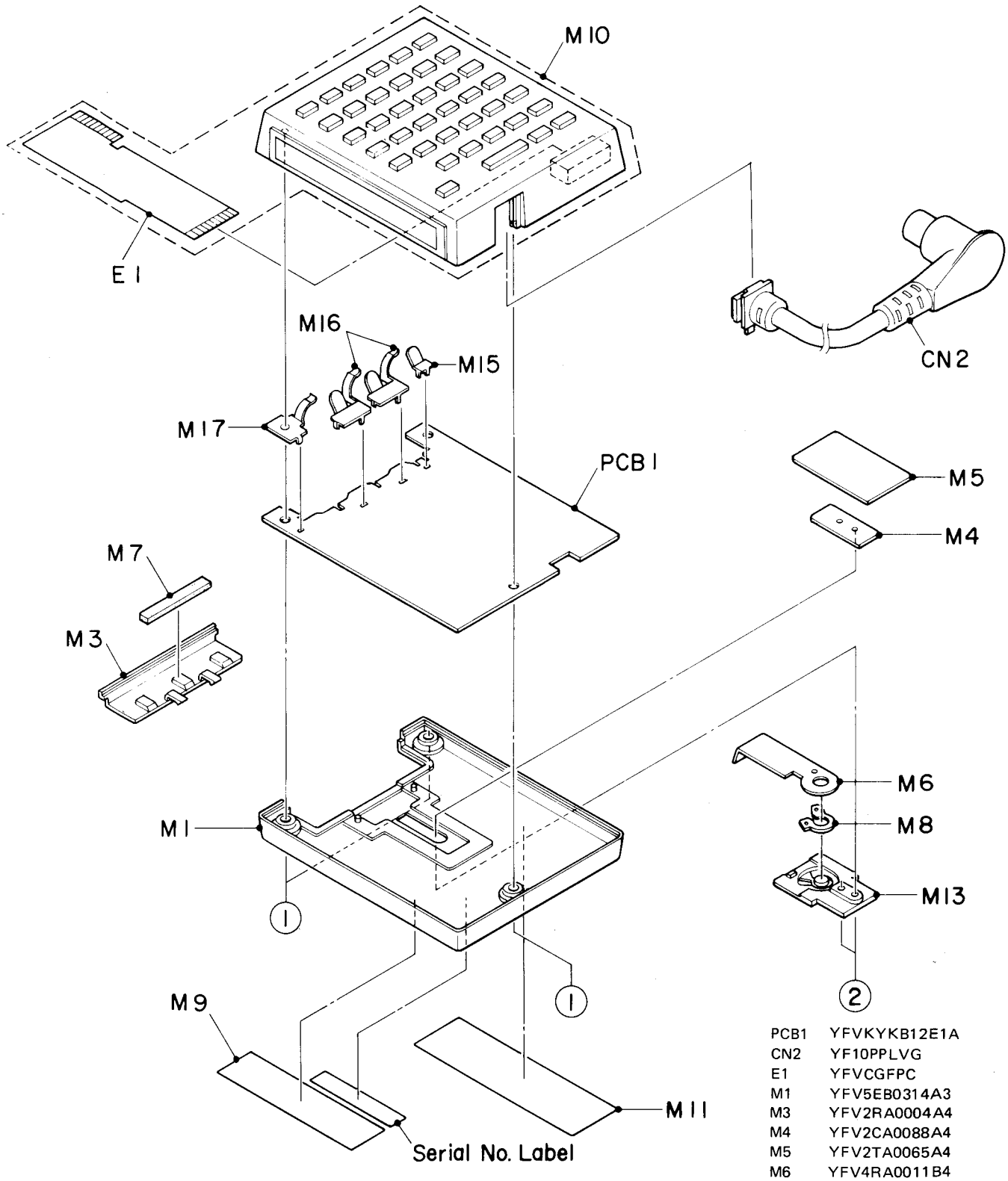
MN1287CVN



MN4042BS



EXPLODED VIEW OF WV-KB12

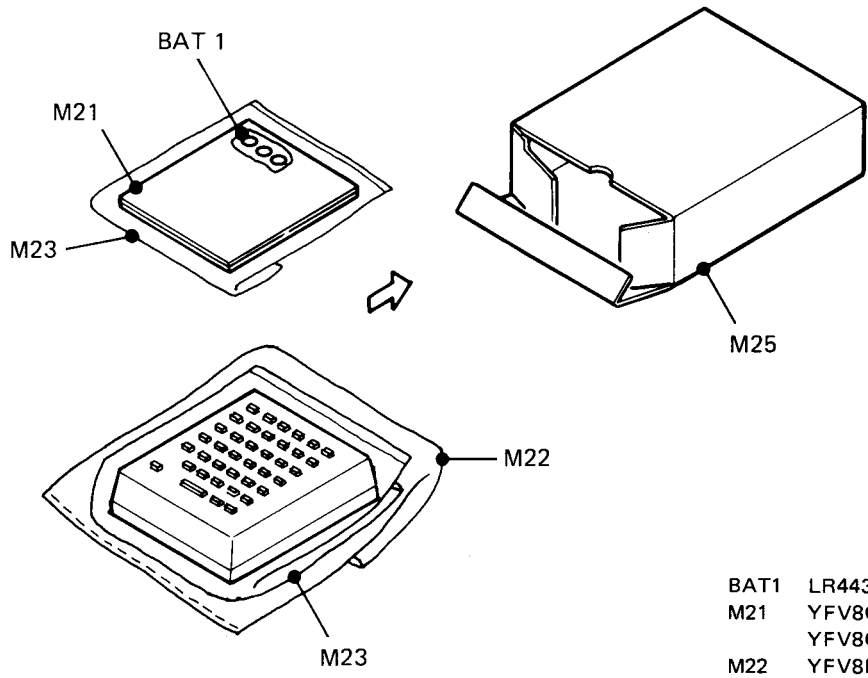


PCB1	YFVKYKB12E1A
CN2	YF10PPLVG
E1	YFVCGFPC
M1	YFV5EB0314A3
M3	YFV2RA0004A4
M4	YFV2CA0088A4
M5	YFV2TA0065A4
M6	YFV4RA0011B4
M7	YFV2FA0108A4
M8	YFV4JA0095A4
M9	YFV7QA0950A4
	YFV7QA0953A4
M10	YFVAKA0440AN
	YFVAKA0441AN
M11	YFV7SA0246A4
M13	YFV2EA0030A4
M15	YFV4JA0092A4
M16	YFV4JA0093A4
M17	YFV4JA0094A4

◯ Numbers Show Screws.

①	XTN26+10BFXK	Pan Head Tapping Black Screws
②	XSS2+5FXK	Flush Head Machine Black Screws

PACKAGING



BAT1	LR443P
M21	YFV8QA0920AN
	YFV8QA0923AN
M22	YFV8EA0008A4
M23	YWT10X16C03
	YWT15X20C03
M25	YFV9CA0729AN
	YFV9CA0732AN

REPLACEMENT PARTS LIST

Important Notice

1. Components identified by ⚠ mark have special characteritics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
2. Components identified by o mark are new parts used from this model.
3. Complete printed circuit board assembly is not available as replacement part.

SYMBOL NO.	PART NO.	DESCRIPTION
MISCELLANEOUS		
CN2	YF10PPLVG	10 Pin Cable Connector
M1	o YFV5EB0314A3	Bottom Cover
M3	o YFV2RA0004A4	Battery Case
M4	o YFV2CA0088A4	Hold Plate
M5	o YFV2TA0065A4	Mounting Bracket
M6	o YFV4RA0011B4	Lever
M7	o YFV2FA0108A4	Cushion
M8	o YFV4JA0095A4	Spring
M9	o YFV7QA0950A4	Main Label for WV-KB12E
	o YFV7QA0953A4	Main Label for WV-KB12N
M10	o YFVAKA0440AN	Upper Cover Assy for WV-KB12E
	o YFVAKA0441AN	Upper Cover Assy for WV-KB12N
M11	YFV7SA0246A4	Operation Label
M13	YFV2EA0030A4	Guide
MAIN BOARD		
PCB1	o YFVKYKB12E1A	Printed Circuit Board Assy
IC1	AN2560S	IC
IC2	NJM3414M	IC
IC3	AN6914S	IC
IC4	MN1287CVN	IC
IC5	MN1554CVQ	IC
IC6	TC5517BFL-20	IC
IC7	MN4042BS	IC
Q1,2	2SB709-QRS	Transistor
Q3-6	2SC2404-CD	Transistor
Q7,8	2SB709-QRS	Transistor
Q10	2SD601-QR	Transistor
Q11,13	2SB709-QRS	Transistor
Q15,17	2SD601-QR	Transistor
Q18	2SB709-QRS	Transistor
Q21	2SD601-QR	Transistor
Q22,23	2SB709-QRS	Transistor
Q25,26	2SC2404-CD	Transistor
Q27	2SB709-QRS	Transistor
D1	MA3056HTW	Diode
D2,3	MA151WK	Diode
D4-6	MA151K	Diode
R1,2	YF2116622JT	Carbon 6.2K ohms 1/16W
R3	YF2116562JT	Carbon 5.6K ohms 1/16W
R4,5	YF2116302GT	Carbon 3K ohms 1/16W
R6	YF2116221JT	Carbon 220 ohms 1/16W
R8	YF2116222JT	Carbon 2.2K ohms 1/16W
R9	YF2116221JT	Carbon 220 ohms 1/16W
R11	YF2116222JT	Carbon 2.2K ohms 1/16W
R12	YF2116102GT	Carbon 1K ohms 1/16W
R13	YF2116123JT	Carbon 12K ohms 1/16W
R14	YF2116103JT	Carbon 10K ohms 1/16W
R15,16	YF2116102JT	Carbon 1K ohms 1/16W
R17	YF2116472JT	Carbon 4.7K ohms 1/16W
R18	YF2116302GT	Carbon 3K ohms 1/16W
R19	YF2116273JT	Carbon 27K ohms 1/16W
R20	YF2116153JT	Carbon 15K ohms 1/16W
R21	YF2116152JT	Carbon 1.5K ohms 1/16W
R22	YF2116123GT	Carbon 12K ohms 1/16W
R23	YF2116104GT	Carbon 100K ohms 1/16W
R28	YF2116223JT	Carbon 22K ohms 1/16W
R29	YF2116682JT	Carbon 6.8K ohms 1/16W
R31	YF2116103JT	Carbon 10K ohms 1/16W
R32,33	YF2116222GT	Carbon 2.2K ohms 1/16W
R34	YF2116682JT	Carbon 6.8K ohms 1/16W
R36	YF2116393GT	Carbon 39K ohms 1/16W
R37	YF2116473GT	Carbon 47K ohms 1/16W
R38	YF2116204GT	Carbon 200K ohms 1/16W
R39	YF2116472JT	Carbon 4.7K ohms 1/16W
R40,41	YF2116563JT	Carbon 56K ohms 1/16W
R42,43	YF2116682JT	Carbon 6.8K ohms 1/16W
R44	YF2116103JT	Carbon 10K ohms 1/16W
R45	YF2116203JT	Carbon 20K ohms 1/16W
R46	YF2116103JT	Carbon 10K ohms 1/16W
R48	YF2116363JT	Carbon 36K ohms 1/16W
R49	YF2116472JT	Carbon 4.7K ohms 1/16W
R50	YF2116822JT	Carbon 8.2K ohms 1/16W
R53	YF2116104JT	Carbon 100K ohms 1/16W
R54	YF2116154JT	Carbon 150K ohms 1/16W
R56	YF2116274JT	Carbon 270K ohms 1/16W
R57-59	YF2116103JT	Carbon 10K ohms 1/16W
R61	YF2116474JT	Carbon 470K ohms 1/16W
R62	YF2116103JT	Carbon 10K ohms 1/16W
R63	YF2116473GT	Carbon 47K ohms 1/16W
R64	YF2116333GT	Carbon 33K ohms 1/16W
R65-72	YF2116222GT	Carbon 2.2K ohms 1/16W
R73	YF2116224GT	Carbon 220K ohms 1/16W
R74	YF2116104GT	Carbon 100K ohms 1/16W
R75	YF2116393GT	Carbon 39K ohms 1/16W
R76	YF2116472JT	Carbon 4.7K ohms 1/16W
R77	YF2116332JT	Carbon 3.3K ohms 1/16W
R78-85	YF2116683GT	Carbon 68K ohms 1/16W
R86,87	YF2116103JT	Carbon 10K ohms 1/16W
R88	YF2116106JT	Carbon 10M ohms 1/16W
R91, 92	YF2116102JT	Carbon 1K ohms 1/16W
R93	YF2116472JT	Carbon 4.7K ohms 1/16W
R94	YF2116562JT	Carbon 5.6K ohms 1/16W

SYMBOL NO.	PART NO.	DESCRIPTION	
R95,96	YF2116223JT	Carbon	22K ohms 1/16W
R97,98	YF2116222GT	Carbon	2.2K ohms 1/16W
R99	YF2116223JT	Carbon	22K ohms 1/16W
R100, 101	YF2116222GT	Carbon	2.2K ohms 1/16W
R102	YF2116152JT	Carbon	1.5K ohms 1/16W
R104	YF2116824JT	Carbon	820K ohms 1/16W
R105	YF2116102GT	Carbon	1K ohms 1/16W
VR1	EVM13SW00BQ3	Variable Resistor	4.7K ohms
C1	YF400101CHJT	Ceramic	100 pF
C2	ECEA1AKS470	Electrolytic	47 µF 10V
C3	YF400101CHJT	Ceramic	100 pF
C6	ECSF1CE336	Electrolytic	33 µF 16V
C7,8	YF400681SLJT	Ceramic	680 pF
C9	ECEA1AKS220	Electrolytic	22 µF 16V
C10	ECEA0JKS470	Electrolytic	47 µF 6.3V
C11	YF400681SLJT	Ceramic	680 pF
C12	YF400821SLJT	Ceramic	820 pF
C13	ECEA0JKS220	Electrolytic	22 µF 6.3V
C14	ECEA1AKS470	Electrolytic	47 µF 10V
C15	ECEA0JKK100	Electrolytic	10 µF 6.3V
C16	ECEA0JKS470	Electrolytic	47 µF 6.3V
C17	ECEA0JKK100	Electrolytic	10 µF 6.3V
C18	YF400470CHJT	Ceramic	47 pF
C19,20	YF400472XMT	Ceramic	4700 pF
C21,22	YF400222XKT	Ceramic	2200 pF
C23	YF400471CHJT	Ceramic	470 pF
C25	ECEA0JKS220	Electrolytic	22 µF 6.3V
C26	YF400101CHJT	Ceramic	100 pF
C27	YF400180CHJT	Ceramic	18 pF
C28	ECEA0JKS470	Electrolytic	47 µF 6.3V
C29	YF400222XKT	Ceramic	2200 pF
C30,31	YF400330CHJT	Ceramic	33 pF
C32	ECEA0JKS220	Electrolytic	22 µF 6.3V
C33	YF400470CHJT	Ceramic	47 pF
C34	ECEA0JKS470	Electrolytic	47 µF 6.3V

SYMBOL NO.	PART NO.	DESCRIPTION	
C35	YF400222XKT	Ceramic	2200 pF
C36	ECEA1AU101	Electrolytic	100 µF 10V
C37	ECEA1HKK010	Electrolytic	1 µF 50V
C38,39	YF400683FZT	Ceramic	0.068 µF
C40	ECEA1AKS470	Electrolytic	47 µF 10V
C42	ECEA0JKS220	Electrolytic	22 µF 6.3V
C43	YF400271CHJT	Ceramic	270 pF
C50, 51	YF400820CHJT	Ceramic	82 pF
C52	YF400470CHJT	Ceramic	47 pF
C53	YF400151CHJT	Ceramic	150 pF
CT1	YFTZ03P600YR	Trimmer Capacitor	60 pF
L1, 4	YFNL45T220K	Coil	22 µH
L5,6	YFNL45T8R2K	Coil	8.2µH
L50	YFNL45T220K	Coil	22µH
L51	ELEMH220KA	Coil	22µH
X1	KBR-3.58MS	Oscillator	
J1-3	YF21160R00T	Jumper Resistor	
CN1	YFFPC13SS1T1	Connector	
E1	YFVCGFPC	Flexible Wire Assy	
M15	YFV4JA0092A4	Spring A for Battery	
M16	YFV4JA0093A4	Spring B for Battery	
M17	YFV4JA0094A4	Spring C for Battery	

ACCESSORY PARTS/PACKAGING

BAT1	LR443P	Battery(x3)
M21	o YFV8QA0920AN	Operating Instruction for WV-KB12E
	o YFV8QA0923AN	Operating Instruction for WV-KB12N
M22	YFV8EA0008A4	Polyethylene Bag
M23	YWT15X20C03	Polyethylene Bag for WV-KB12E
	YWT10X16C03	Polyethylene Bag for WV-KB12N
M24	VQA0120-2A	Warranty Card
M25	o YFV9CA0729AN	Packaging for WV-KB12E
	o YFV9CA0732AN	Packaging for WV-KB12N

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